

Cook (A.B.)

JOINED TWINS.

THE

Obstetrical and Surgical Management,

WITH

REMARKS.

BY A. B. COOK, A.M., M.D.,

Professor of the Principles and Practice of Surgery, Kentucky School of Medicine, Louisville, Ky.



LOUISVILLE, KY.:

BELL & CO., PRINTERS, 111 WEST GREEN STREET.

1869.

EDWARD L. WILSON

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1911

Memorial Inscription for Edward L.

EDWARD L.

EDWARD L. WILSON

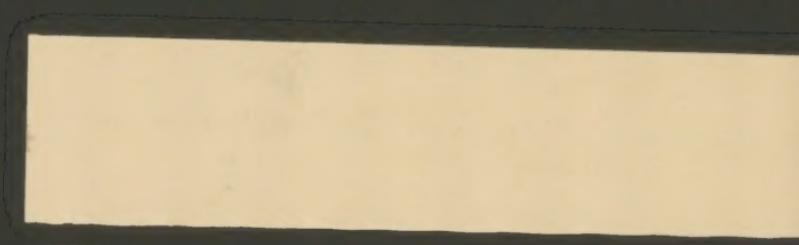
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*From the Richmond and Louisville Medical Journal, of
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In the human organism, a monstrosity—something out of the common order of nature—has, in all ages, been of frequent occurrence. We would exclude from this general definition, abnormal developments, such as club-foot, supernumerary toes and fingers, cleft-palate, &c., and limit the term to the complex anomalies of conformation. In the days of mythology, monstrous births were regarded as omens of evil, the displeasure of God or the

work of the evil spirit. The laws of ancient Greece and Rome required them to be put to death; even as late as the seventeenth century, they were either killed or secluded from sight, and in this century, in some countries, they were confined in certain limits. Happily for this unfortunate class of beings, with the light of science—the guiding and unerring star of hope—a brighter day dawned. In this enlightened century, they are by the general public, gazed upon only as curiosities; pandering to a morbid taste to see the irremediable deformities of a fellow-being. To the lover of medical science, whose mission now is: First, to acquaint himself with the structure of the human body and the sciences based thereon; next, to know when to interfere with and when to let nature have her course; they present a study of peculiar interest in the departments of anatomy, physiology, pathology, obstetrics and surgery.

Three theories have been advanced to account for the cause of double monster, which Vorlick states as follows:*

First. The double monster is supposed to have proceeded from two distinct embryos, which have become united in the course of development.

Second. It has been thought to originate in a single germ, which has become double, or has become subdivided.

Third. The germ has been regarded as abnormally compound from the beginning, implying that the organs and parts composing the double monster are at once produced from this germ, without either separation or coalition of its parts, other than belongs to the natural process of development.

Of these theories, it would appear to the writer, that the third is the most natural and rational—that double

monsters are *ab ovo*—developed from an original double germ. The first is discarded from the fact that double-yolked eggs, when brought to incubation, as was done by Prof. Allan Thompson, M.D., never produced joined twins. Nor would this mode of production account for one or more of the vital organs being common to the two, while all the other organs are duplicated. The second theory predicated on the division of a single germ, appears untenable, although Prof. Thompson demonstrated such a division in the egg of a goose after five days' incubation, which condition, if developed, would produce two united living creatures; but we have no record to show that any segmentary division of a primitive single germ ever matured. The law might apply to some of the lower orders of animal life in which, if a part be removed from a matured body, an exact analogue will be reproduced.

This segregation does not pertain to mammals; it is true, the latter are, the viscera excepted, originally developed in two lateral symmetrical halves, which ultimately unite to form the perfect being, but it seems entirely incredible, that the lateral halves of an originally single germ should, by mere excessive growth, develop two perfect individuals, joined only by some part of the osseous structure or soft tissue, when there is no power to reproduce a limb or an organ that has been removed by accident or disease. A legitimate reasoning from this hypothesis would lead us to expect ordinary, separate, perfectly formed twins, from a primary division of the nascent germ; for if the division could produce two united, there is no reason why an entire separation would not develop two separate fœtuses, whether there existed either one or two umbilical cords. Were such a division the result merely of accident or excess of growth, we would, out of the great family of mammals, see more

frequent departures from nature's common laws, whereas this compound class or type are exceedingly rare in comparison with the aggregate number of births.

The limits of this article will not permit a relation of the minute classifications of monstrosities. It will be sufficient for our purpose to state, that the following case belongs to that tribe of compound monsters, which Geoffroy St. Hilaire calls *autositaires*—two individuals equally developed and having life in common. This tribe represents two varieties, *first*, where the umbilicus is double; the union being effected at any portion of the trunk or head. To this class belong the black twin sisters of North Carolina, now living; the celebrated Hungarian sisters, who died at the age of twenty-two, and a few similar pairs; each pair being united by a lower part of the spine or sacrum.

The *second* variety, representing those having one single or common umbilicus, are united by the soft parts of some portion of the abdominal or thoracic walls, or both.

This latter mode of union is by far the most frequent and hence of greater professional interest, which is my apology for adding one more to the list already recorded

For the privilege of presenting to the profession this interesting case of joined twins, I am indebted to my friend, Dr. E. C. Bright, of Eminence, Ky., who was kind enough to present them to me in the spring of 1865. The Doctor informs me he was called to see the mother, a mulatto, aged twenty-eight years, in this, her third confinement, March 29th, 1865. The labor commenced about 7 o'clock P. M., and terminated about 12 o'clock, midnight; the entire labor embracing but five hours. The mother had no unusual symptoms, and was not unnaturally large during the pregnancy. The children were living when labor commenced, but died before

delivery was accomplished. He first saw the patient about 8 o'clock p. m.; the head of the presenting fœtus occupied the first position, and was, in a few minutes, delivered; it respiration two or three times, when life ceased. No further progress being made, as is usual, at this stage, he made a thorough examination, and detected the presence of twins. Still failing to effect further delivery, he called Dr. D. N. Porter, of Eminence, in council. By this time the uterine contractions had forced down the head and shoulders, sufficient to detect, by a digital examination, the existence of a connecting band. Traction, with forceps, was then made on the head of the presenting fœtus, which force, with other manipulations, brought down the nates and feet; the time occupied about one hour. The second fœtus, head also presenting in the first position, was delivered soon after without any manual aid. The single placenta, larger than common and having but a single umbilical cord, was removed at the usual time, and the mother rapidly convalesced without any after treatment. I have been unable to ascertain whether the mother has borne any children since. Dr. B. injected them, through the common carotid arteries, with a solution of the chloride of zinc and had a photograph taken, of which, plate No. 1, is an exact copy. Since they came in my possession, I have kept them in a solution of the same material. At present they are well preserved, without offensive odor, and all the tissues, organs and muscles are dissected with facility. Previous to making any dissections, a solid injection was thrown into the vessels through the common umbilical vein and common carotid arteries by Geo. J. Cook, M.D.

The twins were born at full time, sex male, general physique, except at the bond of union, perfect, height of each nineteen inches; conjoined weight, 48 hours after

birth, 13 pounds.* The connecting band extends from the



zyphoid cartilages downwards to a point where the natural umbilicus should be; the skin is continuous on each surface with the corresponding abdominal walls, natural in appearance and without any trace of a median line or raphe between them. The band measures in its vertical diameter 4 inches; transverse at the sternal border $1\frac{1}{2}$ inches, at the umbilical border 2 inches; thickness through the lower half $\frac{1}{2}$ of an inch, upper half 1 inch. There is but one common umbilical cord, which enters at the centre of the inferior border of the band, thus forming one single umbilicus for two beings; it is natural in size and appearance, and is composed of one com-

*PLATE No.1.—Anterior view from a photograph, as they appeared after birth. R and L. Right and left foetus. a, connecting band. b, superior or sternal margin. I, inferior or umbilical margin. U, common umbilical cord, entering the centre of the lower margin at the common umbilicus C.

mon umbilical vein and four hypogastric arteries with the usual envelopes.

Dissection. A vertical incision was made in the median plane of the band, and transverse incisions at each border, dividing the skin and superficial fascia. The flaps being reflected, the zyphoid cartilages were found to connect in the centre, forming a section of an inverted arch between the twins, one half an inch in width and one line in thickness. A common linea alba, formed by the tendons right and left alternately of the broad abdominal muscles, extended from the junction of the cartilages down to the point at which the umbilical cord entered; here it bifurcated, one branch extending to the

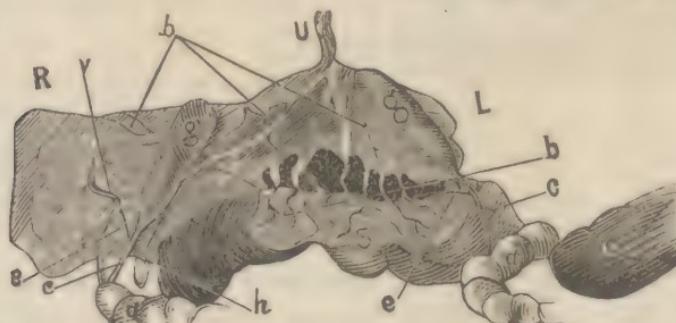
symphysis pubis of each fetus. A linea alba similarly formed connected the left and right abdominal muscles in the posterior wall of the band. The recti muscles were next exposed, by dividing and reflecting the aponeuroses forming their sheath. Each rectus muscle had two lineæ transversæ, and was perfect, except being a little longer than usual. A triangular flap, embracing the remaining fascia and peritoneum, was then reflected down, which exposed a common cavity, three inches in its vertical diameter.

The peritoneum formed one great continuous sac, which accommodated itself to the separate abdominal walls and viscera of each fetus, and a single liver common to both.* This viscus occupies an anomalous position; the greater part of the organ is suspended across the upper half of the cavity in the connecting band, the extremities terminating in the right hypo-chondrium of each fetus. Its vertical diameter in the centre or mesian plane is one and a half inches; transverse diameter four inches, and thickness through the middle three fourths of an inch. It has two borders, two extremities and two surfaces. The posterior border is rounded, thick, slightly concave and attached to the under surface of the common diaphragm by one continuous reflexion of the peritoneum. The anterior border is sharp, irregular and pointed or nodulated at the centre of the band. The ends terminate in tongue-



*PLATE NO.2 -Represents the common abdominal walls, divided and reflected to show the position of the superficial viscera; F F, the flaps, L, common liver; u, umbilical vein; i, small intestines; S, right stomach inflated; o, part of left great omentum and colon inflated; D, diaphragm; h h, the two hypogastric arteries of each fetus; b, left bladder and the urachus projecting from its apex. The posterior border is rounded, thick, slightly concave and attached to the under surface of the common diaphragm by one continuous reflexion of the peritoneum. The anterior border is sharp, irregular and pointed or nodulated at the centre of the band. The ends terminate in tongue-

like processes, each one occupying the position of the great lobe of the liver in the natural order of development. The right end, measured from the median line, is longer and more slender than the left; but about one half of the cubic dimensions of the organ lie on each side of this line. The upper surface is free, smooth and covered with peritoneum. The under surface is irregular; in the mesian plane is a central depression or fissure occupied by the common umbilical vein, which is attached to the liver by a reflection of the peritoneum that represents the suspensory ligament. On either side are irregular elevations which may be termed the analogues of the quadrilateral lobes. External to these on each side is a fissure occupied by the gall bladder.* Further removed from the central line, we have reflected from the under-surface two gastro-hepatic omenta which connect with the small curvatures of the two stomachs. Between the folds of the omenta, we find, for each foetus, the usual vessels, viz: vena-porta, hepatic artery, hepatic duct, nerves and lymphatics, entering into or emerging from



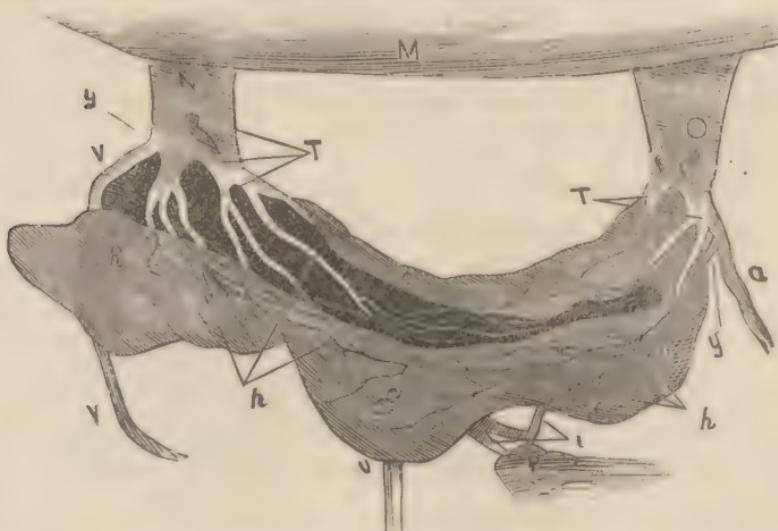
*PLATE No. 3—Represents the liver reflected upwards to show the under-surface, with sections exhibiting the principle branches and common distribution of the umbilical vein. R, right, L, left extremity; S, section showing branches of the umbilical vein; b b, divisions of the vein springing from the common trunk U; g g, the gall bladders; e e, hepatic ducts joining the cystic ducts to form e e, the ductus communis choledochus of each side; d d, vertical portion of the duodenum showing the terminus of the biliary ducts; v, the vena portae of the right side entering the portal fissure; h, hepatic artery of right side; O, the stomach of the left foetus inflated.

imperfectly developed fissures. In the left fœtus, the ascending cava passes the under-surface near its narrow terminus, (plate 1) where it is joined by the ductus venosus and hepatic veins. In the right fœtus, the ascending cava makes a curve from the right to the left of the vertebral column (plate 4) and is joined by the ductus venosus and hepatic veins as it passes the posterior border to perforate the diaphragm on the left of the spine and connect with the right auricle. The parenchymatous structure is analogous to other livers, with this difference: that in this common organ we find no trace of any septum denoting an original development in two parts, and we have two sets of hepatic vessels having a promiscuous distribution from which common reservoir they distribute to two distinct individuals. In utero they were supplied with maternal blood through one common channel, the umbilical vein; and nourished and developed from one common source, the placental blood, which flowed through one common organ before general distribution. We have, in this abnormal development, an irregular substance suspended in the septum, carrying the life-blood of two human beings. It is covered by peritoneum; the vertical line of its under-surface is occupied by the trunk of the umbilical vein; on either side two gall bladders, two cystic ducts, two hepatic ducts; further removed from the common mesian plane, and nigher the centre of the under-surface, two shallow fissures, each giving exit to biliary ducts and deep lymphatics distributed to two separate alimentary canals and thoracic ducts, each transmitting a hepatic artery, vena portæ and hepatic nerves to nourish, support and feed a chemical laboratory, which distributes alike its invigorating or baneful fluids to two living beings. In the interior we find, first, the distribution of the umbilical vein represented in plate No. 3 at u and b b; second, we find in the lobules the

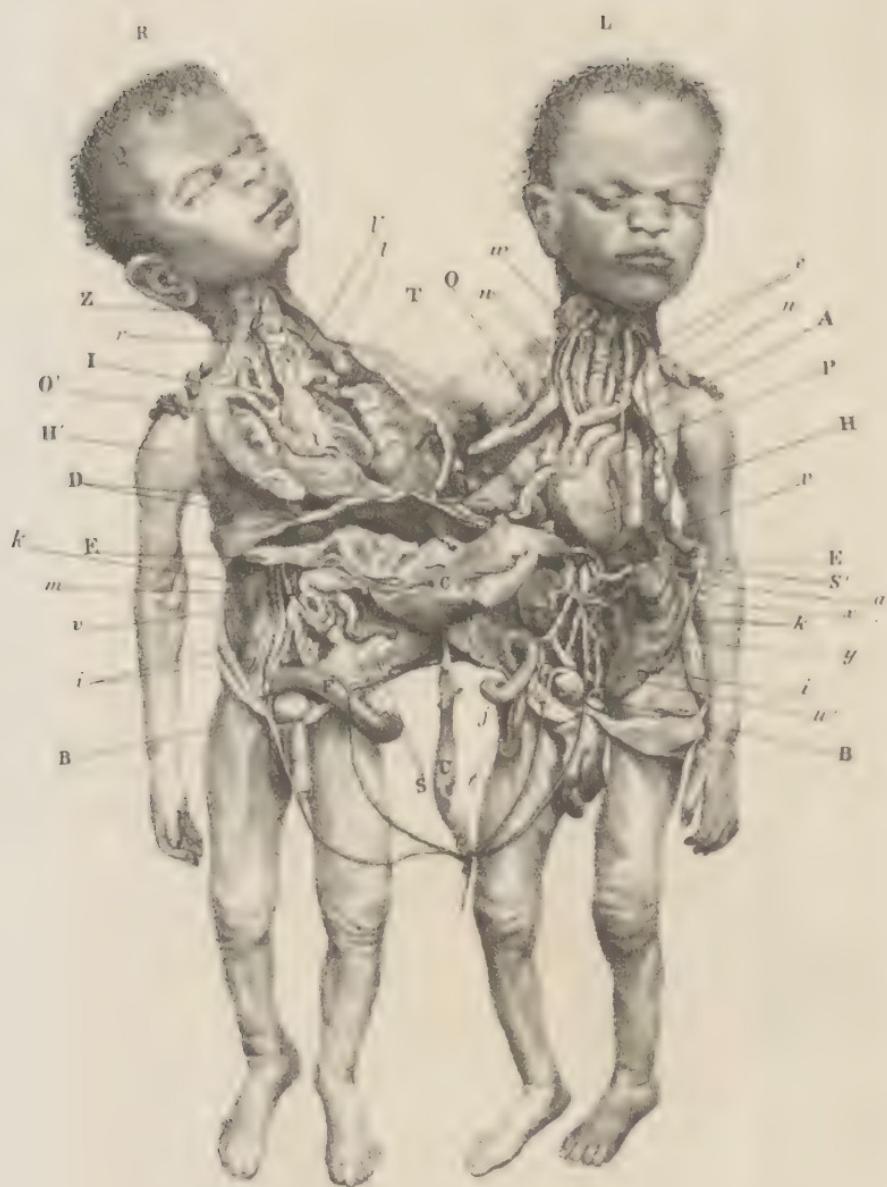
terminal capillaries of the hepatic arteries, hepatic ducts, lymphatics and nervous twigs, and the commencing radicles of the hepatic veins, which are ultimately developed into two hepatic systems, each of which converges toward and connects with the respective inferior cavae as seen in plate No. 4 at h h, t t, N and O.*

The office of this liver might be compared to that of a filter, placed in a recess common to two households, and from either extremity pouring out to the occupants a constant stream of pure invigorating fluid or distributing the germs of sickness and death.

The anatomical peculiarities are briefly summed up as follows: 1. The junction of the zyphoid cartilages; 2, two linea albas; 3, one common diaphragm; 4, one common peritoneum lining a common cavity and two sets of



*PLATE No. 4.—Upper surface of the liver showing the common distribution of two distinct hepatic veins; R, right, L, left and, c.c., centre of the upper surface; h h, branches of the hepatic veins converging and coalescing toward either extremity; t t, trunks of the hepatic veins; v, right vena cava ascendens; N, the common venous trunk of the right fetus; a, left vena cava ascendens uniting with the left hepatic veins to form the common trunk O; s, small section of liver detached to show hepatic veins at i; u, umbilical vein; y y, ductus venosus of each side; M, common diaphragm showing the openings for the cavae N and O.



viscera, with one exception; 5, one common umbilical vein; 6, one liver, with a double circulation; 7, the curve of the inferior cava of the right fetus to the left side of the vertebral column; 8, the radical change in the relations of the vena cava, hepatic veins and venous ducts to the posterior border of the liver; 9, the duplication of all the organs (liver excepted) as represented in plate 5.*

The physiological questions may be very briefly considered in two relations: first, through the common liver and, second, through the connecting soft tissues. In the liver terminate the peripheral extremities of a portion of the two great nervous systems; the cerebro-spinal axes, connecting its animal sympathies with the cerebrums through some filaments derived from the pneumogastric and right phrenic nerves. The ganglionic systems connecting intimately and inseparably, the organic functions through the hepatic plexuses derived from the solar plexuses of two beings. We have in the nerves, a union of sympathy and organic function. The complicated

*PLATE No. 5.—R, right, L, left foetus; C, common liver; E E, right and left extremities of the liver; U, umbilical vein; D, common diaphragm; S, stomach and duodenum; v v, inferior or ascending venae cavae; m, superior mesenteric vein entering the under-surface of the right extremity of the liver; S', spleen; a, splenic artery; x, splenic vein; y, superior mesenteric artery distributed to a portion of jejunum j; k k, kidneys, the right kidney of the left foetus having the capsule removed to show the lobulated structure, renal artery and vein, and the left kidney surmounted by the supra renal capsule; i i, common iliac arteries diverging from abdominal aortas, also showing the four hypogastric arteries tied to the end of the cord U; u', ureters of the left foetus; B B, the bladders, showing in each the urachus projecting from the apex; t, gubernaculum testis; F, sigmoid flexure of the colon inflated and turned back; H, heart of the left foetus, on either side of which the lungs are seen; P, pulmonary artery; A, aorta with ductus arteriosus concealed; O, superior or descending cava formed by the union of the right and left venae innominate seen above; they again each formed above by the internal jugular and subclavian veins; e, common carotid arteries of the left foetus; n n, right and left pneumogastric nerves; w, trachea; H', heart of the right foetus enveloped in its pericardium, the latter attached to the diaphragm; the lungs are shown on either side; O', superior or descending cava of the right foetus, formed by the junction of the brachio-cephalic veins; I, arteria innominata dividing into the right common carotid and subclavian arteries; l, left subclavian vein; l', left internal jugular vein; T, thymus gland; r, thyroid body; z, larynx.

structure of the organ fits it for its great function, the distillation of the bile, a constant secretion in greater or less quantities; and constantly delivered from this common source to two digestive apparatuses.

This fluid, complex in its chemical composition, is not a mere excretion as some maintain; but it is a necessity to nutrition and life, as proved by experiments on dogs in which death soon followed the absence of bile in the intestinal canal. Two lymphatic systems also act their part in the hidden mysteries which govern the laws of health. In short, this single organ performs all the important physiological functions connected with the liver for two individuals.

The physiological union through the soft tissues of the connecting band are of minor importance, being limited to the capillary inoculations of the sanguineous and lymphatic systems, and the intermingling of the sensor and motor nerves for a short distance on either side of median line. The healthy relations of the two then are common, derived from the same fountain head and disturbed by the same causes.

In their pathological relations any symptomatic disease of the liver, whether functional or organic, would necessarily affect both alike. Functional disorders of any of the duplicated organs, as the brain, lungs, heart, etc., of one would not disturb necessarily the health of the other twin. Local inflammations in one, as pneumonia, nephritis, dysentery, &c., would not be developed in the corresponding organs of the other, but he would only suffer from the symptomatic fever communicated through the circulation. Idiopathic disease, as typhoid fever, and zymotic disease, as small-pox, rubeola, poison, &c., would affect both simultaneously through the vascular and lymphatic connections. The administration of all remedies, acting through the systemic circulation, would influ-

ence both alike in consequence of the two capillary anastomoses—first, and most important, in the liver, and, second, in the connecting band.

The Obstetrical Relations.—The frequency with which monster births have occurred in all ages and all countries, as evinced by the number of cases found in medical museums, private offices, and reported in the medical journals every year, attaches great and special importance to this part of the subject. These births are not premature, as is generally supposed; but they come at full term like ordinary confinements, without any premonition of the complication. In the following reported cases, only one was said to be premature and this one only twenty days before the time. Such a birth may occur under the supervision of any practitioner, the proper obstetric management of which, in many instances, involves the life and future health of the mother and the life of the two unfortunate twins. In this embarrassing perplexity the impulse of the moment is not always a correct index to the proper treatment necessary to be instituted. One rash, inconsiderate step will jeopardise the life of three human beings. The hopes of the mother and friends are concentrated in the adjudged superior skill and wisdom of the attendant physician. What landmarks, then, have we from past experience?

W. S. Playfair, M.D., selects from Dr. Allan Thompson's classes four varieties which interest the obstetrician :*

First. Two nearly separate bodies united in front to a varying extent by the thorax or abdomen.

Second. Two nearly separate bodies united back to back by the sacrum and lower part of the spinal column.

*See *Obstetrical Transactions*, VIII.

Third. Dicephalous monsters, the bodies being single below but the heads separate.

Fourth. Bodies separate below, but the heads fixed or partially united.

Dr. Playfair has collected 31 cases belonging to these four classes, which present the following ratio of frequency: First class, 19; second class, 3; third class, 7; fourth class, 2. It will be observed, as a point of professional interest, that a fraction over three-fifths of the whole number belong to the first class.

Of the thirty-one births, twelve were delivered by natural powers and without difficulty. How fortunate that nature is so provident and sumptuous in her resources, to overcome obstacles.

In the nineteen cases belonging to the first class, to which, also, belongs the pair presented in this paper, and the Siamese twins now living, of whose birth no account has ever been given, the labors resulted as follows: "One (mother) died undelivered; eight were terminated by natural powers, in three of which the feet and in three the head presented; in two the presentation is doubtful; six were delivered by turning, or by traction on the lower extremities; four were delivered instrumentally."

In the three feet presentations, delivered by natural powers, the best account is given by Fanzango, of joined twins, born alive at Camignore, November 6, 1602, who lived a number of years and were exhibited in Italy. The bodies were only united by the upper part of the abdominal walls. Fanzango remarks:—"It was a happy circumstance for the mother that she was not under the charge of a practitioner with his head full of the doctrines of the surgeons on this subject, otherwise he probably would have performed some severe and dangerous

*See *Obstetrical Transactions*, VIII.

operation, mutilating the children, with the view of aiding delivery." The same remark is *apropos* to the surgeons and physicians of the present day, who think the Siamese twins have committed a great sin by remaining, as nature formed them, *united*.

In the cases of version terminating favorably, the mechanism of the labors was the same as in feet presentations. The best account of delivery, by version, is given by Drs. Brie and Molas, each relating a case in his own practice. Dr. Brie called to see a patient under the charge of a midwife, found two feet belonging to two different children presenting. He replaced one foot and brought down one corresponding to that already born, made traction and delivered the lower half of the child; the connecting band prevented further progress. He then recognized the mode of connection, introduced the hand, brought down the feet of the second child, and by continued traction delivered both simultaneously as far as the heads; at this juncture all progress was arrested and further pulling only increased the difficulty. He then made traction "by turning the bodies of the children over the abdomen of the mother, the posterior head became engaged in the pelvis and after it was delivered the second easily followed."

Dr. Molas' case occurred in a healthy multipara, aged thirty-two years. The labor commenced at 7 p. m., August 15, 1822; 6 o'clock a. m, next morning, the os uteri being fully dilated, the membranes were ruptured. The two heads presented at the brim of the pelvis at the same time; he tried to push one aside to allow the other to descend; no further progress being made in one hour of strong pains, he desisted. He suspected joined twins and determined to turn: he introduced his hand, found the children united by the thorax and brought down the feet of both. "The bodies were delivered with ease and

the arms came down of themselves, but considerable difficulty was experienced in extricating the heads, which was only effected by pulling the bodies of the children well over the abdomen of the mother, so as to get the posterior head to engage first in the pelvis."

In three cases—the labor conducted by natural powers—the head remained the presenting part; the trunk, nates and feet followed by evolution; then usually follow the feet of the second child. In some, the head of the second child presents after the body of the first child is delivered, as in Dr. Bright's case, which was skillfully managed. In other instances, the two heads are born first, one immediately after the other, and the two bodies pass the straits of the pelvis simultaneously. When this occurs the head of the hindmost fits into the depression formed by the neck of the first child; to do this requires a wide and well-formed pelvis.

In the second class—united back to back—the labors terminated without manual assistance. In the two described, the head presented first.

One case is that of Hélène and Judith, who lived about twenty-three years. "Hélène was born as far as the umbilicus, and after the lapse of three hours, her breech and legs descended. Judith was expelled immediately afterwards, her feet descending first." The same mode of delivery accompanied a case related by M. Norman; the children were born alive and survived nine days. This class is more easily delivered than the first, in consequence of the union at the lower part of the trunk, allowing more latitude of motion and permitting the breech and lower extremities of the first to pass readily by evolution.

In the third class—dicephalous monsters—two of the seven cases were delivered by nature's powers; one head first presenting, then the body and next the second head.

In the only two cases related, belonging to the fourth class, the head was perforated in one and version resorted to in the other. It is remarkable, that in all these reported cases, the mothers, with one exception, made good recoveries.

The management of the labor in all the classes may be best studied from the following rules laid down by Dr. Playfair, in the summary of his excellent article:

1. Of the various classes of monstrous twins, those in which the bodies are joined by the sternum or abdomen are much the most common.
2. The most favorable presentation is undoubtably that of the lower extremities; and if the head present, and the nature of the monstrosity can be recognized, turning should be resorted to, and the feet of both children brought down to the pelvis.
3. The bodies can generally be extracted without much difficulty by direct traction, until the shoulders have passed. In doing this, the backs of the fœtuses should be placed in one of the oblique diameters of the pelvis.
4. The bodies should then be turned well over the abdomen of the mother, so as to cause the posterior head to pass first into the cavity of the pelvis. If this cannot be effected, the anterior body must be amputated, when the other will probably pass without difficulty.
5. If the head presents, the body corresponding to the first-born head may be expelled by a process similar to that of spontaneous evolution, or the second head may be expelled with its occiput fitting into the cavity formed by the neck of the first child. Failing in either of these terminations, mutilation of the fœtuses will be required.
6. In class two, in which the children are joined back to back, the mechanism of delivery is essentially the same as in class one, whether the head or feet present¹. But evolution of the body of the first-born child, in head presentations, is probably accomplished with greater ease.
7. In class three, after the birth of the first head, the body must be expelled by evolution. If this is not accomplished, it will be advisable to decapitate the first-born head, and to terminate the labor by bringing down the feet of the child.
8. In class four, when either the head or feet present,

if the head causes obstruction, it must be lessened by perforation, when, in all probability, there will not be much difficulty experienced in effecting the birth of the bodies.

No record of the number of these thirty-one cases of twins born alive is given. The great majority die during delivery, from continued pressure on the umbilical cord, occasioned by the delay in delivering the first body, where they are born one at a time; or, by the delay in the passage of the two heads through the pelvic straits, where the feet present either naturally or by version. It is highly probable, if the rules, already quoted, are promptly carried out, the mortality in future will be very much diminished.

The great surgical question to be decided is the propriety of an operation to sever the bond of union. Is it justifiable? Will its results terminate favorably to the lives of both? Are we, in the premises, warranted in jeopardizing the lives of two individuals, for the purpose of adding to their personal comfort and convenience, and, we may add, our own fame?

The rational solution of these questions depends on the nature of the attachments. When a dwarf, miniature or blighted fetus is attached to the superficial soft parts of some portion of a healthy, well-developed child, viz: the cheek, as in Prof. Pancoast's case, an operation would be highly proper with every reasonable hope of success. But where the attachments involve any considerable portion of the abdominal or thoracic walls, an operation under any circumstances, when the twins are in good health, is questionable; nor do previous results justify its performance.

In order to indicate some of the insuperable anatomical objections, we will refer to some of the abnormalities of visceral conformation recorded in some few instances

at my command, where dissections were made. First case, reported by T. H. Tanner, M.D.* Sex, female; still-born at the eighth month. The attachment extended from the top of the thorax down to where the natural umbilicus should be. The thoracic cavity was common, containing two lungs, one heart and one sternum. The abdominal cavity was common, "having one liver, one spleen, two kidneys and one set of intestines," one single cord and placenta. Second case, reported by J. G. Swayne, M.D.† Sex, male. The union extended from the umbilicus to the top of the thorax. There was one sternum and four clavicles, one thoracic cavity with a pericardium, containing two separate perfect hearts, one venous connection through a large branch connecting the right vena innominata of one fœtus with the left vena innominata of the other. In the abdomen there was a single diaphragm, one common liver, one umbilical cord having one vein and four arteries. All the other organs in both cavities were duplicated.

Third case, by W. Wills, Esq.‡ Sex, male; children were well developed and connected from the upper part of the thorax down to the umbilicus. Umbilical cord double and in one sheath entered the cavity between the fœtuses; one large single liver, one gall bladder with two biliary ducts and one large spleen. The intestinal canals and all other abdominal and thoracic viscera were double and perfect.

It may be argued that the connection in these instances was too extensive, and, therefore, they are not analogous cases and do not militate against an operation where the attachment is limited to the ensiform cartilages and abdominal walls. The thoracic attachments have nothing

*See *Obstetrical Transactions*, Vol. II.

†See *Obstetrical Transactions*, Vol. II.

‡See *Obstetrical Transactions*, Vol. VII.

to do with the question, these cavities are separate and distinct from the abdomen. Had the bond of union been limited to the latter, the same malformation would have existed, viz: in each instance one or more of the vital organs single and common to both. Who then can determine beforehand, with certainty, that a similar or some other malformation does not exist, where a similar union of soft parts obtains?

In the case reported by myself, there was nothing in a superficial examination to indicate the presence of a liver in the band. The upper half of the band was thicker than the lower, somewhat soft and spongy to the touch, feeling more like thickened cellular tissue, with the ensiform cartilages prolonged through the upper margin, than an organ. There were no arteries of sufficient size to give any considerable impulse when compressed. Had they lived and grown up, it is reasonable to suppose, that the wearing of boys apparel, would have diminished the width of the band, and that the pressure on the surfaces would have gradually changed the shape of the liver, by lessening the size in the central portion and enlarging the two extremities. No organ in the body is so amenable, without injury to its structure and function, to a change of form, either from external or internal pressure. Constant tight lacing will entirely alter the shape and even the natural position of the liver. Cruveilhier, in his anatomy, says of the liver: "It may even be said to be, as it were, ductile or maleable under the influence of slowly exerted pressure." Speaking of tight lacing, he says: "A circular constriction and a fibrous thickening of this organ opposite the base of the thorax, sometimes affords evidence of this compression; its transverse and antero-posterior diameters become diminished, and its vertical diameter increased; it projects more or less below the base of the thorax, descends as low down as the right

iliac fossa and may even touch the brim of the pelvis without any *structural lesion.*"

A similar change of form in the liver is likely to occur in living twins joined by the abdominal walls. A common liver, however, in the centre of the band is not uniform; other conformations are found. In one case, out of the one hundred and fourteen reported of this particular connection, viz: an umbilical cord with one envelope, the band was divided, six arteries and one vein were tied on either side of the mesian line on which the incision was made. The success of the operation may be inferred from the report of the case given in the latter part of this article.

An important surgical question of the present day is the propriety of dividing the band connecting the celebrated Siamese twins, the only known pair now living, of this kind of union. No occasion has ever offered to enable me either to see or examine these twins. The proper solution of the question will be decided by the analogies between them and other similar attachments and the results of previous operations. Some distinguished professional gentlemen maintain that they ought to have been separated long ago; first, from the fact that their nervous physiological relations are distinct, and, second, that the bond of union is only cartilaginous. The mere discovery, by touch, that common sensation only exists at the centre and for about one inch on either side of the middle of the band proves nothing; for here we have only the terminal branches of the sensitive nerves of two distinct nervous systems, and this phenomenon is only what any one versed in anatomy and physiology would expect to find. The existence of two separate brains, spinal cords, and nerve branches, in this form of attachment, would naturally develop, in the twins, different dispositions, temperaments, in-

tellects and physiognomies; the same as in disconnected persons. While the vascular and lymphatic inosculations in the band would establish a common sympathy, when either suffered from any disease developing constitutional symptoms. There is not the same reason to look for common sensation in both from touching one twin, as we would expect in our own person having but one nervous system, to feel the sensation of an injury in the left foot, which was inflicted on the right. A single brain and nervous attachments are capable of executing different feats at the same time. Example: the musician singing in one key and playing in two different keys at the same time. (Why not expect two different brains to do the same?)

In regard to the analogies of conformation, Mr. Holmes, (*Surgical Treatment of the Diseases of Children*) says of the Siamese twins, "the band which united them stretched downwards from the ensiform cartilage. It measured three and one-fourth inches in the vertical direction, one and five-eighths inches at its thickest part from before backwards, and it was one and three-fourths inches long at its upper and three inches at its lower edge. The ensiform cartilages of the two bodies meet in this band and seemed to be united by a kind of joint. A hernia projected into the band from the body of each of the twins." Prof. J. C. Warren, M.D., (*Silliman's Journal*, 1830,) who saw them when they were eighteen years old, describes the band as follows: "The substance by which they are connected, is a mass two inches long at its upper edge, and about five at the lower. Its breadth from above downwards, may be four inches; and its thickness in a horizontal direction, two inches." "At its lower edge is a single umbilicus, through which passed a single umbilical cord, to nourish both children in the fetal state." He found this band extremely hard to the touch. It was

found, on a more minute examination, that the hardness existed only at the upper part of the band and was "prolonged into the breast." This substance was formed by a continuation of the *ensiform cartilage*, or lower extremity of the breast bone, from one to the other; its breadth was one and a half inches; its thickness about one eighth of an inch. These projecting cartilages met at an angle in the centre, connected by a ligament which formed a joint. Below the cartilage was felt a rounded cord which Dr. Warren supposed to be the fibrous remains of the umbilical cord. The analogies here, between the external appearance and measurements, and other cases given in the text, are striking. From what Dr. Holmes says, we would infer, that in early life, a free communication existed between the abdominal cavities; from the irritation excited by pressure and pulling, the peritoneal surfaces may have adhered or grown together and closed the common canal through the band.

Such adhesions do occur in this way, and why not here. If it has, it would enhance the probabilities of success in an operation. A double cord in one envelope may have existed, as in case third, referred to above; or the cord may have been single as in the other cases, and coursed through the band which had in it neither a common communication nor a vital organ, as in Dr. Boehm's case mentioned below. The true relations can only be determined by actual dissection. What have been the results of operations in this form of union? Dr. Holmes* says: "As to joined twins, one successful operation for their separation is on record by König." "The band is described as stretching from the ensiform cartilage to the umbilicus, and being an inch broad, one and a half deep and five inches long." The umbilical

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cord was single and contained four arteries and two veins. It will be noticed there was in this case a double cord in one envelope, as in case third, cited above. Dr. Holmes further says: "Its lower part was attached to the band and it *seems doubtful whether the band was really anything more than a fusion of the two cords.*" "A ligature was put upon it first and then divided by the knife." "In the only other case which I have met with, in which the separation of joined twins was attempted, the result was fatal"*

The New York Medical Journal for December, 1868, gives the report of the following case operated upon, taken from the "Revue de Therapeutique Medico-Chirurgicale, of August 1."

Dr. Boehm has successfully performed the operation of separation of twins that were adherent to each other by a fleshy band.

The junction between the two children (females), who were very small, but in other respects well developed, commenced at the inferior extremity of the sternums, which were entirely distinct or separated, and following over the xiphoid cartilage, terminated in a single or common umbilicus. This connecting band was soft to the touch, not unlike a thick cushion of cellular tissue; but there could be felt, as it were, some hard and knotty cords, which later, on dissection, were found to be formed by the cartilaginous branchings which, starting from the two xiphoid appendages, joined together the middle of the band, in order to form a cord, by the side of which coursed the vessels of the umbilical cord. The operation commenced by dissecting up and isolating the vessels of the umbilical cord, which was single and had one envelope, a single sheath closing in all the vessels. This sheath was divided by a bistoury, and the vessels were dissected up three or four inches from the umbilicus. In this way six arteries and one vein were dissected out on each side and were ligated separately. After this the operator made an incision upon the band, parallel to the surfaces of the thorax, and taking care always to keep in

*In the fatal case the union was in the coccygeal region.

the median line, cut more deeply into the cellular tissue, divided the union of the cartilaginous appendages, and, passing between the two points of insertion of the umbilical vessels, arrived finally at the skin on the opposite side, when a single stroke of the knife finished the operation. Very little blood was lost. The two flaps had a length of five and a half centimetres and were united at three points by suture. Union took place by the first intention; but one of the infants, which, from birth, had shown less strength and vitality than the other, died on the fifth day. The other is now living, at the age of five years; is in perfect health and well developed, except that there is a separation six centimetres in length in the linea alba below the xiphoid appendage.

According to the statistical researches of Fürster, out of one hundred and fourteen similar and collected cases, this is only the second, where a successful result has followed the operation of separation."

The result here is certainly a strange kind of success to claim; the band was severed and the feeble child died in five days—the death to be fairly attributable to the operation and nothing else, and an opening, over two inches in length, through the abdominal walls of the living child. So far as regards the *mechanical part*, it was a success, as much so as when a butcher, with usual dexterity in the use of the knife, severs the jugulars of an animal. As to the results, the operation was a *failure*. Had they been let alone, the blood from the healthy child would have aided in sustaining the feeble one, with the same happy results that follow transfusion of blood from the vein of a healthy person into the veins of a patient exhausted from loss of blood or by disease.

The mere dissection of one of these bands is much less difficult and requires less skill than the removal of a tumor from the anterior region of the neck; hence the division is no surgical feat.

The object of an operation is either to remove or release a diseased part, in order to save and prolong life; or to remedy a deformity natural or acquired. To the

former belong operations of necessity, where the aims justify the means, whether the patient survives or dies; as, for example, amputations, strangulated hernia, &c.

To the latter belong operations of choice, where the patients, or their representatives, in cases of minors, solicit an operation. Example: in contracted tendons, moles, supernumerary toes, fingers, cleft palate, &c. It is but seldom bad results to life follow such, and, therefore, they are justifiable.

But where the results have been almost, we might say, universally fatal, as in joined twins, no operation should be hazarded by the advice of the surgeon, unless one should die before the other; then it becomes a necessity. If the twins, knowing all the risks, demand a division of the bond, a surgeon might, under protest, execute the mechanical part, they relieving him of all responsibility. The *success* would be an accident, not skill. If one or both died, he could console himself with the thought that he acted in obedience to their commands and not his judgment.

The Siamese twins have been severely censured for violations of the moral and social relations of life; these strictures being based upon the supposed simplicity of their bond of union. What have they to hope for in an operation, when no one case, coming properly under their particular mode of junction, has been successful? In the only case of success, the band was only one inch in breadth, had two umbilical cords in one sheath, and, as Dr. Holmes remarks, was probably only a fusion of the cords. The preservation of life is an inherent principle, and, in view of all the facts, the Siamese Twins have acted with discretion and much wisdom. As to the moral question, we have only to say to the moralists: first renovate society at home of all the social evils, before going into North Carolina to hunt up the unfortunate Siamese twins, against whom to hurl anathemas.

